PODS

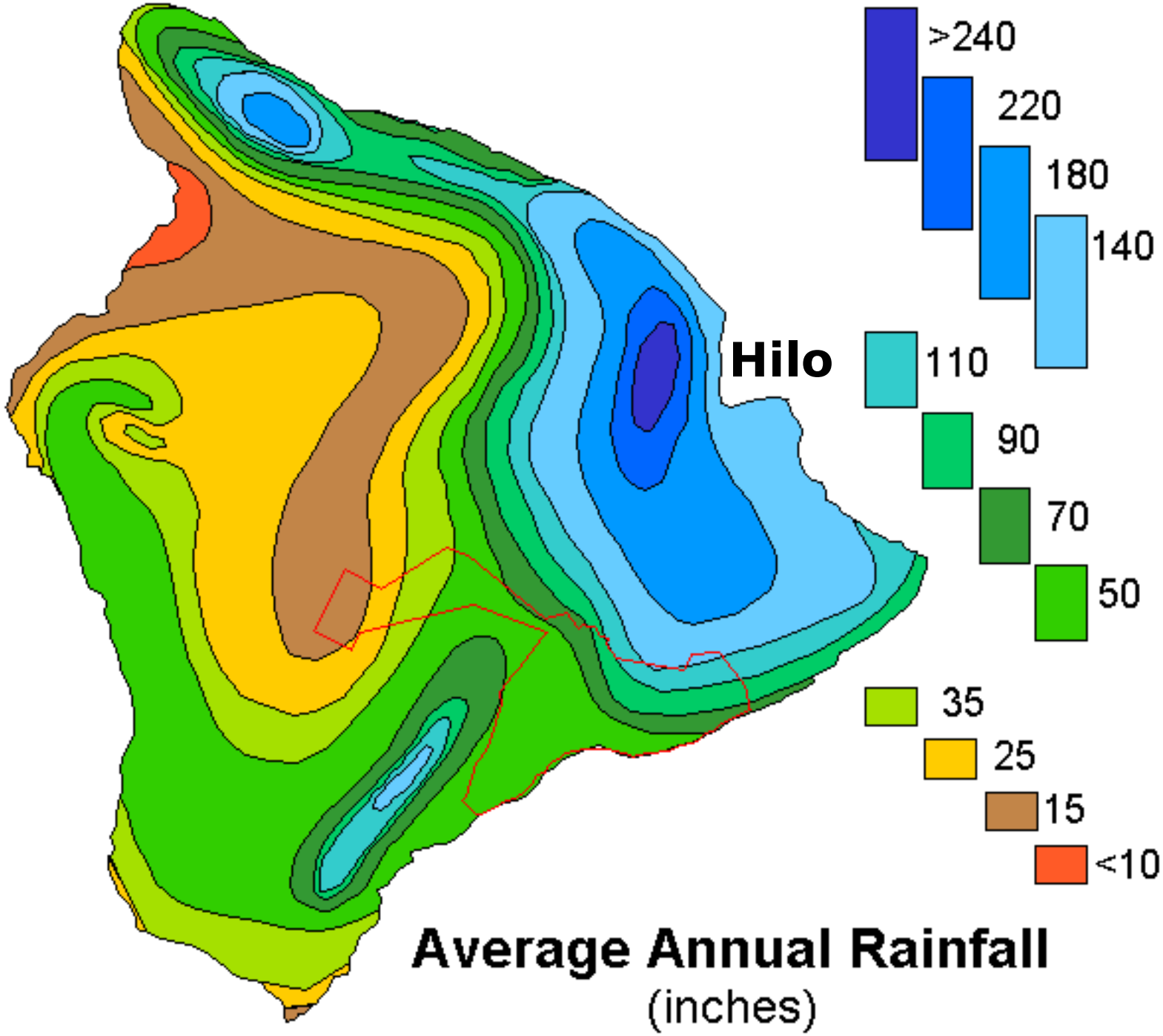
An Ecological Micro-Sensor Network

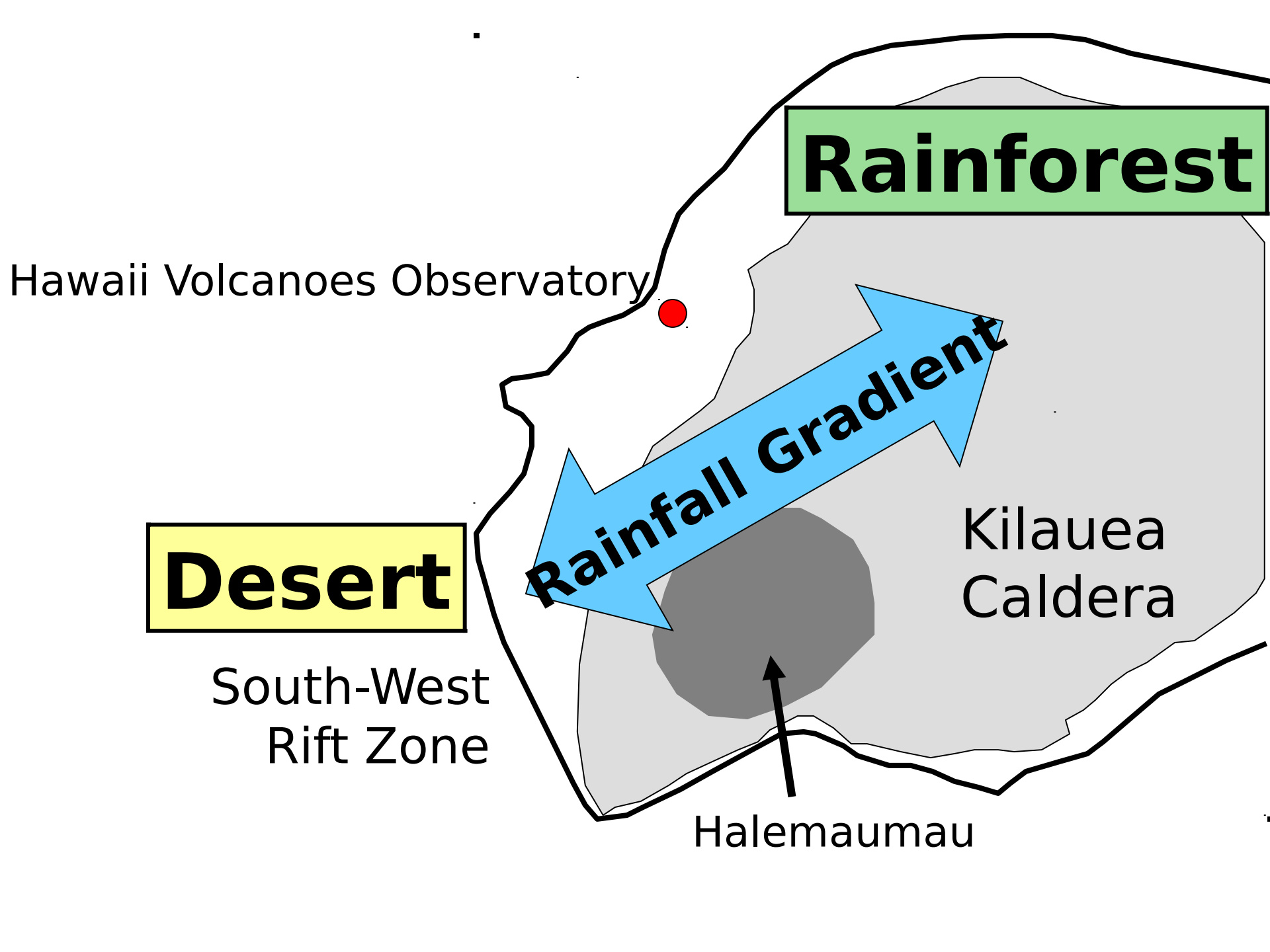
Kim Bridges Botany
Brian Chee Information & Computer Sciences

University of Hawai`i at Manoa

Silene hawaiiensis

Listed as “threatened”
About 2,000 plants remain
All on the Big Island


Hilo
>240
220
180
140
110
90
70
50
35
25
15
<10
Average Annual Rainfall
(inches)


Rainforest
Hawaii Volcanoes Observatory
Rainfall Gradient
Desert
Kilauea
Caldera
South-West
Rift Zone
Halemaumau

South-West Rift Zone

Silene habitat

25
MPH
NEXT 1.
MILES

MIT Media Lab

Computer
Radio
Network Software

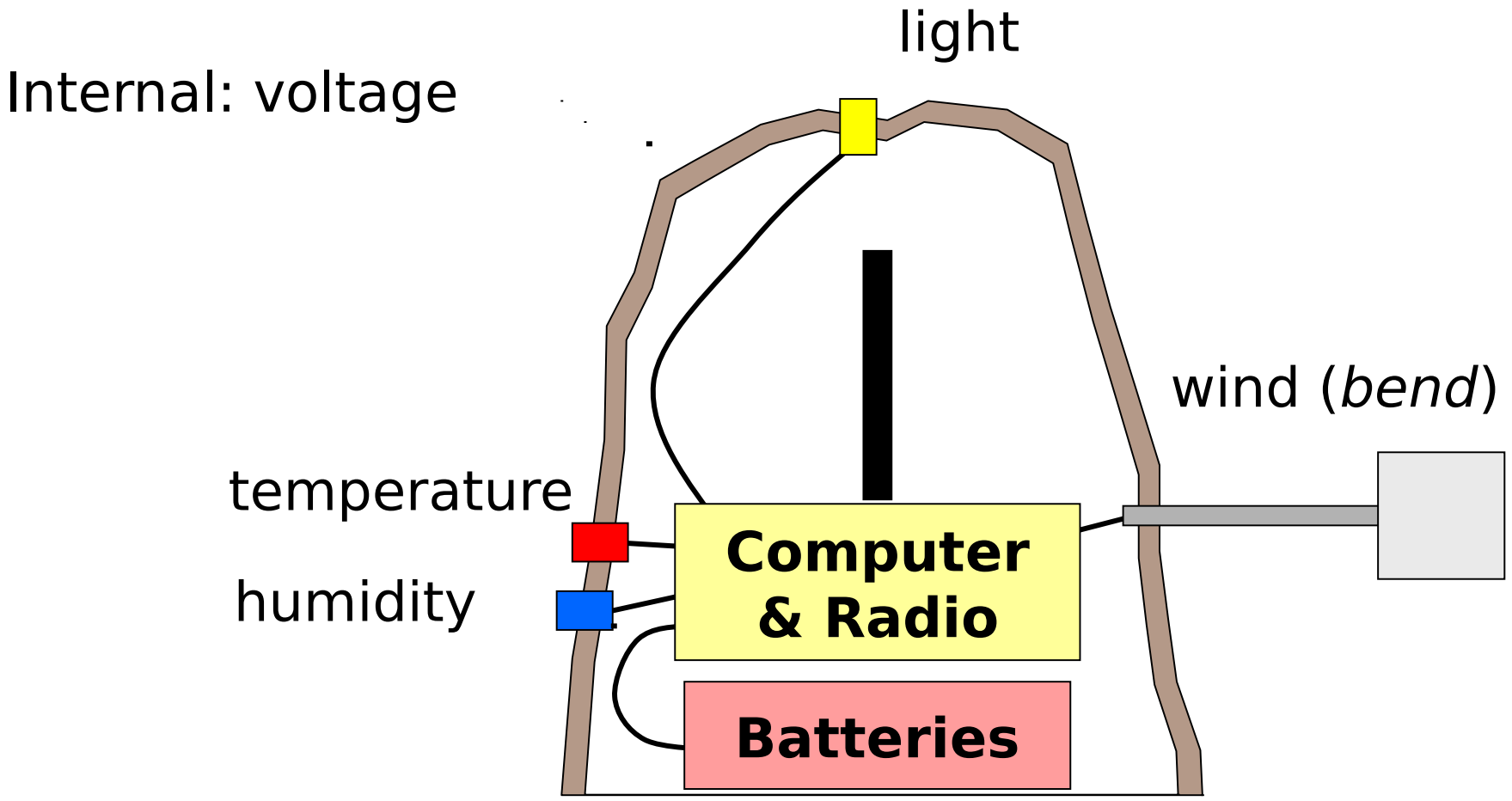
TephraNet

University of Hawaii

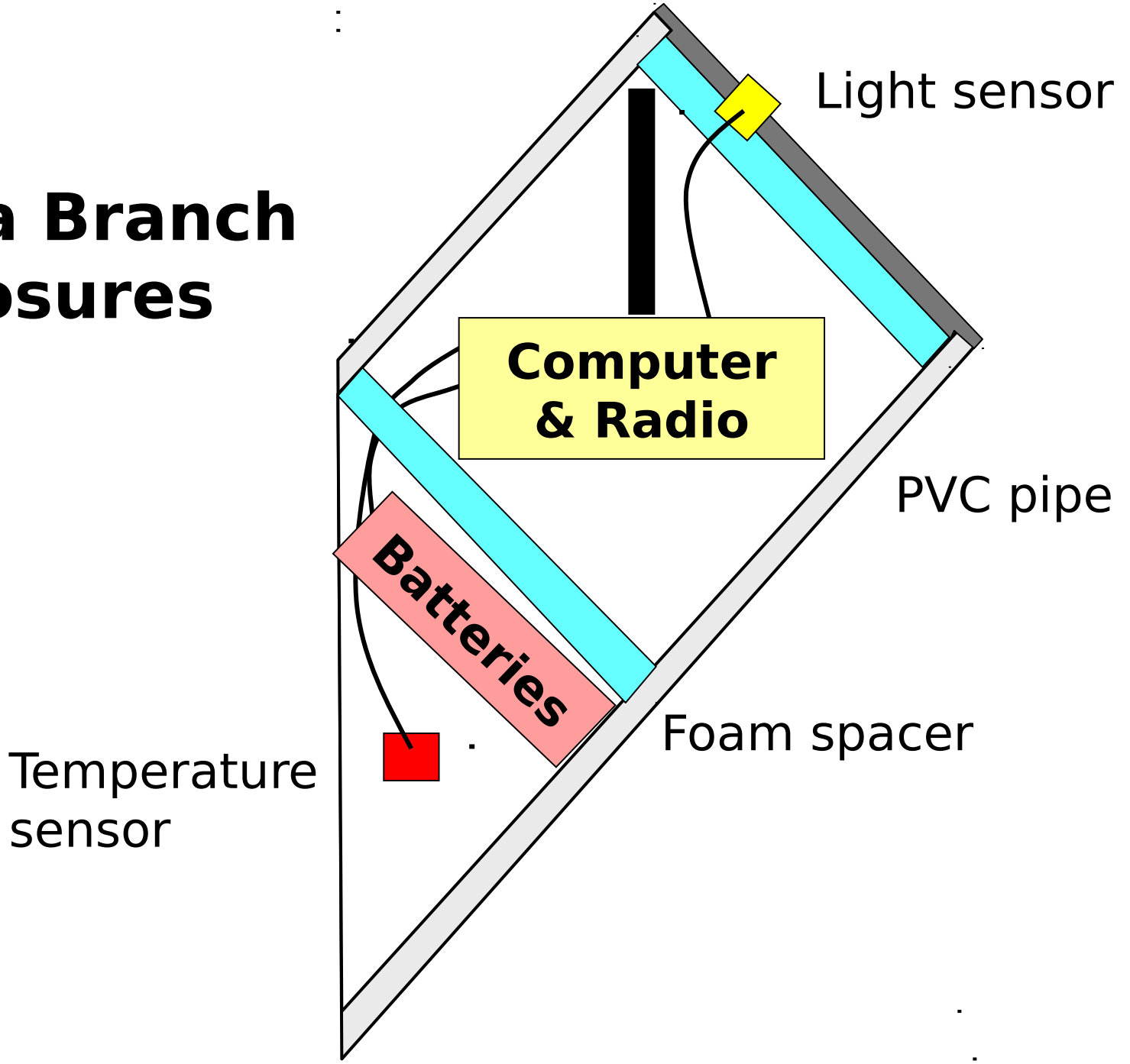
Enclosures
Sensors
Power
Field Site & Study Problem

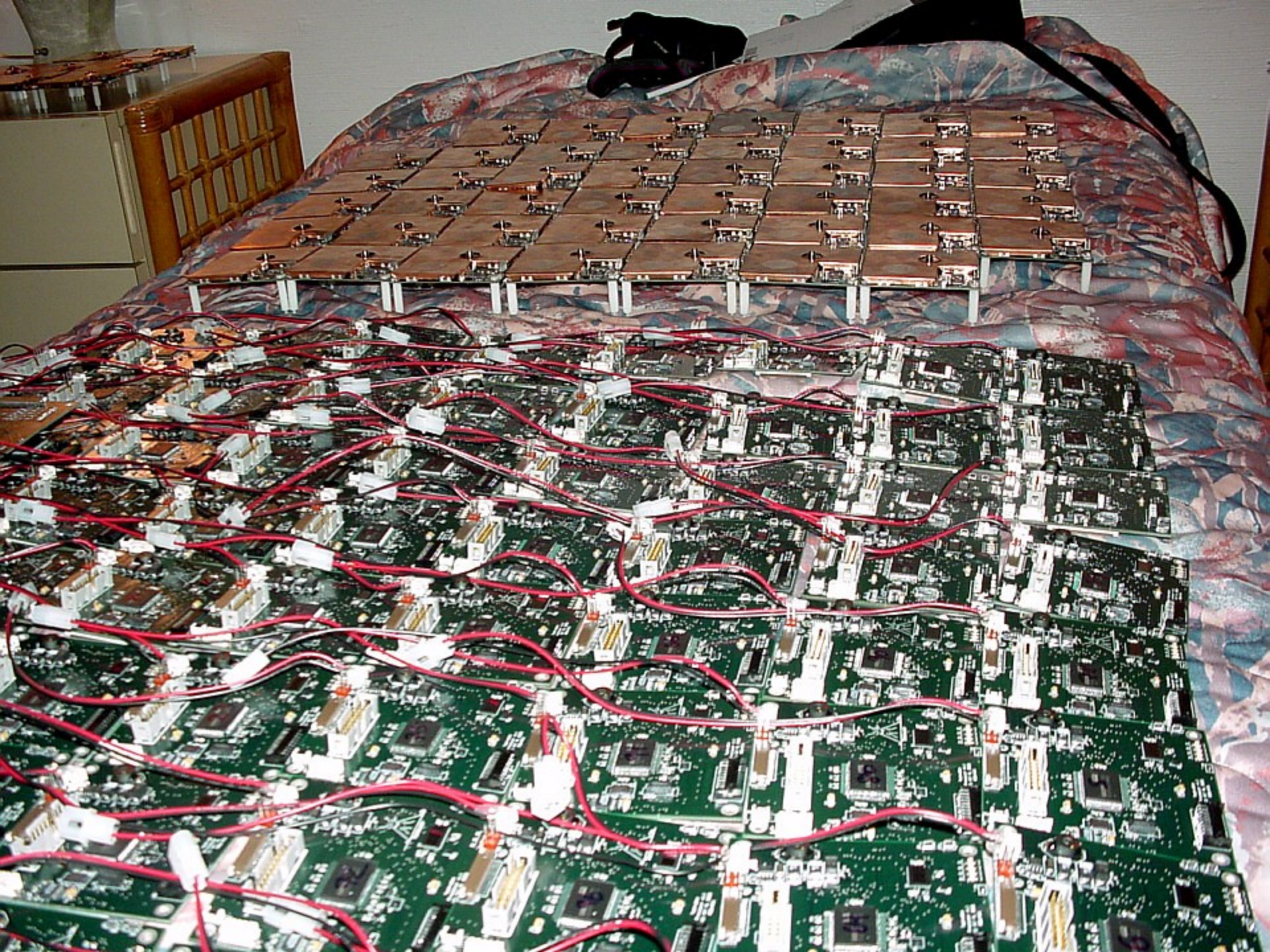
PODS

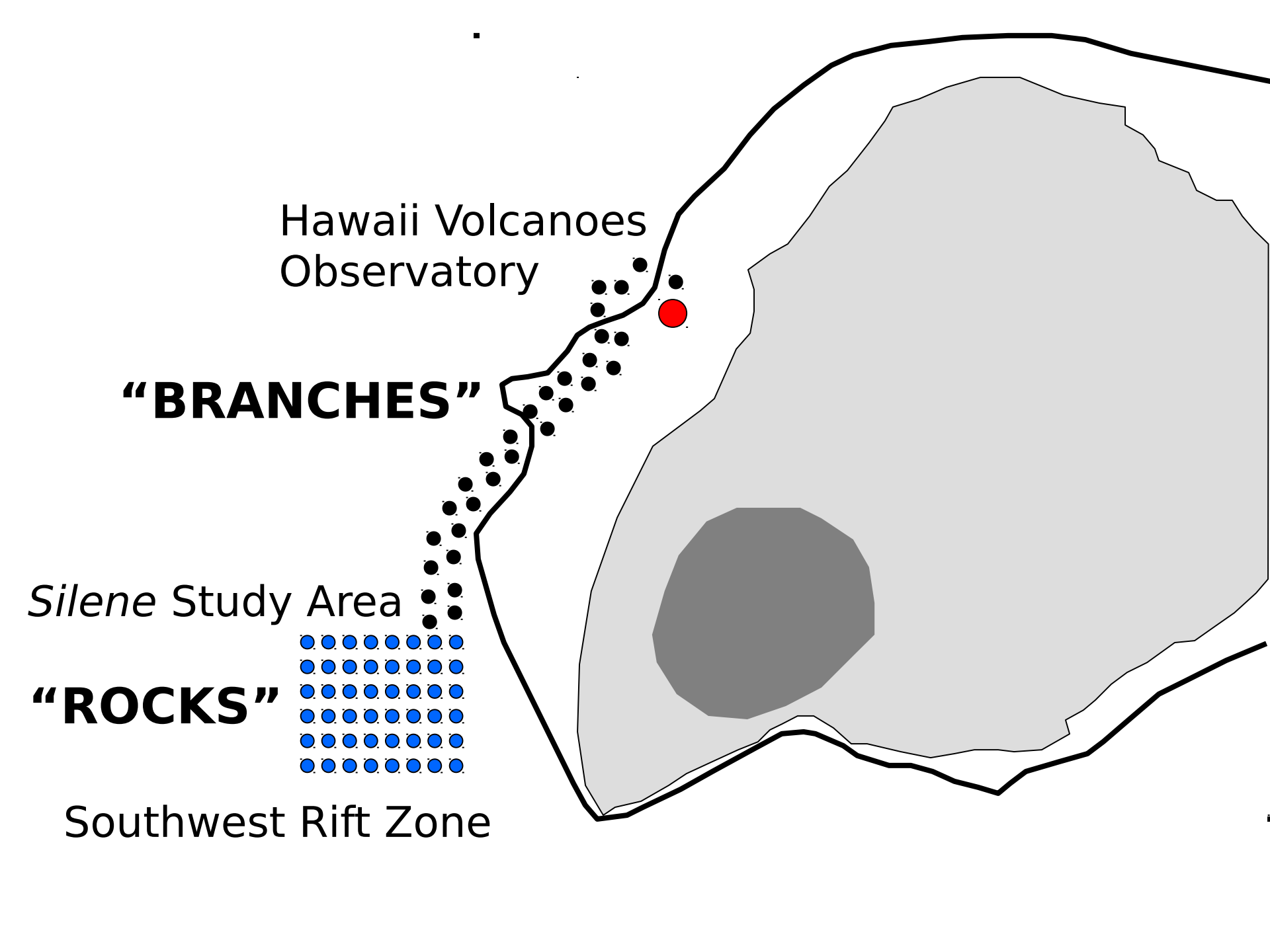
Rock Enclosures



`Ohia Branch Enclosures

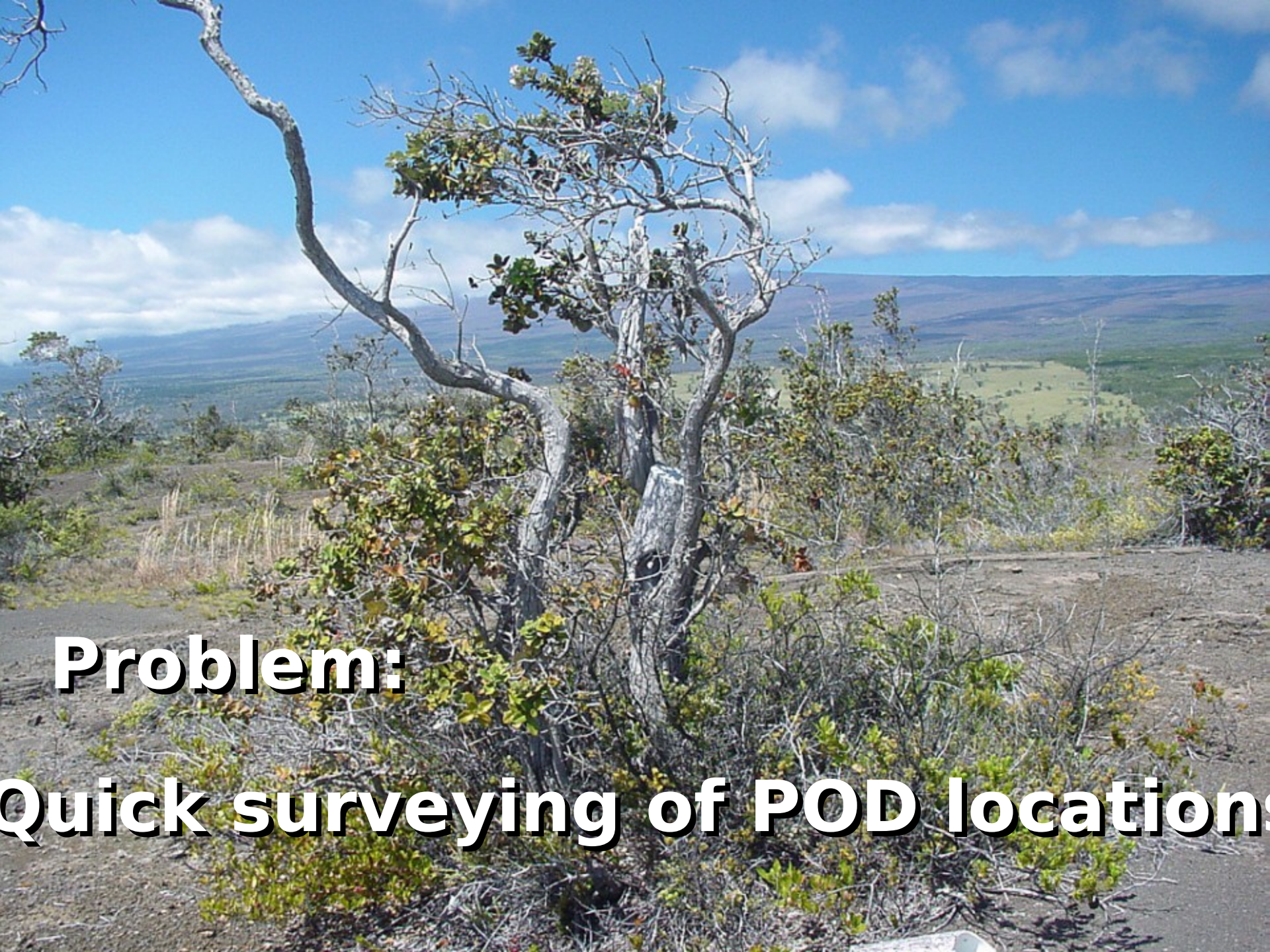





Hawaii Volcanoes
Observatory
“BRANCHES”
Silene Study Area
“ROCKS”
Southwest Rift Zone

Planned Redeployment

- New computers & radios
- New power sources
- Smaller enclosures


Problem:
Quick surveying of POD locations

“Walking Stick”

Locate & document instrument sites

- Digital Camera inside UW case
- GPS
- Laser Ranger
- Hiking Stick

Silene Monitoring

Mark I POD
PC 104 computer
802.11b communications

Ziploc
EZ Fill
TALL SIZE
KYOTO

Computer and Communications
Battery
Camera

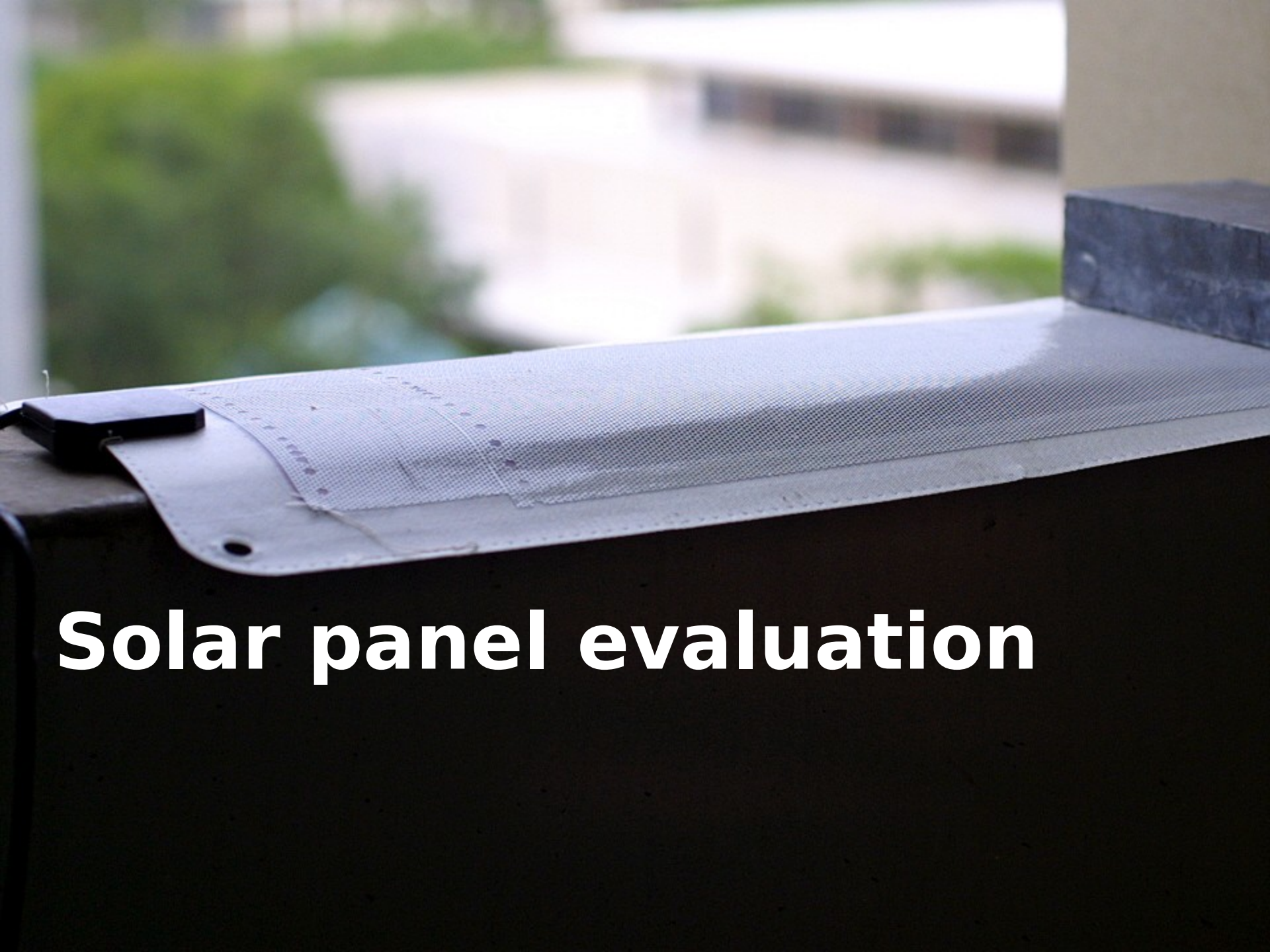
Silene

Goal: *Silene* phenology

Hourly photos

Single plant

Operational ~ 6 weeks
Problem: Power Source



Solar panel evaluation

Final Lab Testing: 4 Mark I PODS

- Hidden Cameras
- Hidden Solar Power
- Wireless Communication

Mark II Pods

- Compaq iPaq 3650 running Linux
- Serial interface to Nikon
- 520ma fully on, 50ma in sleep w/PCMCIA Orinoco card
- CF 802.11b card may dramatically lower power consumption
- Working on fixing power down and timed power up routines
- Bluetooth cameras next?

Relaying Data between PODS

- Developing communication protocols
- Interim: Solar powered 802.11b repeaters

Considerations

- VoIP for emergency phones
- Multipoint vs. dual channel parabolic repeaters